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Prescribed Fire Helps Tennessee State Parks

By April Welch

The Department of Forestry conducts a prescribed burn at a cedar thicket at Cedars of Lebanon. Prescribed burning removes overstory plant material, reducing competition for sunlight, water, and nutrients and allowing shade intolerant endemic glade species to thrive.

Photo by John Froeschauer

Throughout history, fire has played a natural part on Earth. Whether igniting from lava flows or lightning strikes, this natural phenomenon redesigned all landscape it came in contact with.

Ancient cultures used fire to manipulate their environment, utilizing it as a land management tool since the last ice age. From 10,000 years ago to 3,000 years ago, fires were used by Native Americans primarily to drive game animals. Beginning roughly 3,000 years ago, Native Americans harnessed it to clear farmland, create forage for game animals, and to ease travel through thick forest understories.

Fire torches were used to blind deer, drive or corral wildlife, and to attract fish close enough to be speared from canoes. Smoke was used to flush bees from hives and to repel mosquitoes and flies. Fire was used for domestic purposes as well: it served in cooking, heating dwellings, and pottery making while providing light and a means of communication. Warfaring peoples used fire to drive enemy tribes from their homelands and to increase visibility through dense vegetation surrounding villages. As early as the 14th century, Native Americans practiced chemical warfare. Bundles of Poison Sumac or other poisonous plants were burned upwind of the enemy, having severe effects on the attacking force.

Upon the arrival of European explorers and settlers in the early 1500s, fire represented evil and was thought to harm both the spiritual and physical self: fire literally meant the loss of everything, not only the wooden homes and agricultural crops of this new land, but the Puritan soul. Initially, this new North American culture sought to control fire, but with westward expansion, the landscape was changed by fire in order to clear land for agriculture, drive game, and propagate grazing land for foraging livestock.

By the late 1800s, fire suppression was the prevailing land management policy, no longer viewed as a land management tool: fire was a threat to timber and public safety. In the early 1930s, land managers from state, local, and federal levels argued and fought for the return of more natural fire regimes after decades of fire suppression. Although this policy had protected both public and private investments and prevented destruction of forests and prairies, it threatened the ecological integrity of physical and biological resources: its devastating impact was not seen immediately, but slowly mounted, threatening the very resources suppression policies were created to protect.

Leaf litter, branches, trees, and other natural fuels built up on the Earth's surface creating more intense, dangerously fast moving wildfires. Fire was scorching and killing everything in its path, roots to treetops, soil to watersheds, and natural, native flora was replaced by exotic invasive species. Plants relying on extreme temperatures for reproduction were nearing extinction, and pests, parasites, and disease thrived, threatening the health of native species.

Not a new treatment, prescribed burning was reintroduced in the 1930s as a land management tool advantageously countering the harmful effects of past fire suppression. Prescribed fire became the wonder drug for environmental health. Prescribed fire eliminates years of dangerous fuel accumulation thereby reducing the risk of devastating wildfires. It slows woody plant succession and the invasion of exotic species and kills pests including pine bark beetles and cedar apple rust. Fire creates a mosaic of diverse habitats for flora and fauna and helps the recovery of threatened and endangered native species. It triggers and increases seed dispersal; stimulates increased flowering and fruiting of herbaceous species; and prepares seedbeds for germination. Fire removes overstory plant material reducing competition for sunlight, water, and nutrients and breaks down organic matter into soil nutrients and natural fertilizer. For these reasons, prescribed burns are used in Tennessee State Parks and Natural Areas today.

At Long Hunter State Park in Hermitage, cedar glades and barrens are managed with burning to reduce competition of succeeding woody plants. Elms, hackberries, cedars, and sumac overtake clearings reducing the direct sunlight available to shade intolerant glade wildflower species.

The success of one such sun-loving native, the Tennessee Purple Coneflower (Echinacea tennesseensis), relies upon natural disturbance for habitat maintenance. Originally thought to be extinct until rediscovered in 1968, this member of the Echinacea genus was the first plant to be placed on the federal Endangered Species List. Now thriving in the cedar glades, its numbers have increased due to repeated prescribed burns of the Couchville Cedar Glade Natural Area at Long Hunter State Park. The reduced number of competitors has created beneficial openings for seedling establishment essential for the Tennessee Purple Coneflower: juvenile mortality rate is high; therefore, less competition is rewarded with more plants.

Prescribed fire has also killed vegetative roots of competing weedy plants at Couchville Cedar Glade. With shallow bedrock, heavy surface water runoff, and little root structure, surface erosion maintains the five to 12 centimeters of gravelly limestone soil needed for cedar glade endemics to thrive. Other cedar glade wildflower populations including Leafy Prairie Clover (Dalea foliosa), Limestone Fameflower (Talinum calcarium), Slender Ladies' Tresses (Spiranthes lacera), and Hoary Puccoon (Lithospermum canescens) have thrived since the introduction of prescribed burns as a management tool.

Animal habitat has been created by the Couchville Cedar Glade burns. Since burn practices began, bird watchers are enjoying birds such as Cedar Waxwing, Prairie Warbler, Field Sparrow, Indigo Bunting, and Chuck-will's-widow. Barren and edge species have included Eastern Towhee, White-eyed Vireo, and Brown Thrasher.

Deer and rabbit had been missing from the Couchville Cedar Glade until tender shoots emerged from the scorched ground. New grazing forage is not the only advantage: White-tailed Deer have been observed at other burn locations eating the charred bark of trees and the ground ash left after a fire. These minerals attract a wildlife population native to the area not visible at the Couchville Glade in past years. Dead standing trees or snags, decomposing with the help of insects, have created food and shelter for cavity nesting birds like woodpeckers, chickadees, and bluebirds. Downed snags create shelter for fox, squirrel, groundhog, opossum, and raccoon.

Grassy barrens, similar to cedar glades, revert to successional forests without fire disturbance. At Long Hunter State Park, this transformation is evident along the Deer Trail as cedar thickets shade out understory herbaceous species. To control woody plant succession, reduce competition between canopy vegetation and forest floor herbs, and reopen the area to its original grassland, prairie-like state, fire is prescribed.

In one particular area, three prairie grass species dominate the understory: typically drought tolerant plants, these barren grasses thrive after the introduction of fire while other noxious, weedy trees, shrubs, and vines die: exotic species such as Japanese Stilt Grass, Chinese Privet, and Japanese

Honeysuckle are destroyed by fire.

Thin barked ash, elm, and cedar cannot withstand the 500-degree temperatures of short interval burns. Prescribed burning reduces competition from the above canopy, disperses seed, and increases soil nutrients by releasing minerals into the soil from organic matter. Initial physical removal of woody plants including elm, sumac, and cedar has allowed showy wildflowers to germinate and grow in the otherwise sterile herb layer. Dense Blazing Star (Liatris spicata), Sweet Everlasting (Gnaphalium obtusifolium), and Dog Fennel (Eupatorium cappillifolium) thrive along with Split-beard Bluestem (Andropogon ternaries), Sugarcane Plumegrass (Erianthus giganteus), and Elliot's Bluestem (Andropogon gyrans).

The preservation of these endemic cedar glade and barren species has relied on disturbance for centuries. Historically, Native American practices in the Middle Tennessee region, where these ecosystems are located, maintained these richly diverse and unique southeastern desert like landscapes. Today land managers continue in their footsteps. Other Tennessee State Parks where prescribed burns have been implemented include Cedars of Lebanon, Henry Horton, Fort Loudon, and South Cumberland.

"To preserve and protect, in perpetuity, unique examples of natural, cultural, and scenic areas and provide a variety of safe, quality, outdoor experiences through a well-planned and professionally managed system of state parks" is the mission statement of Tennessee State Parks therefore begging the question, why burn what the state has been given to preserve? This plagues many park patrons who fear the flames engulfing prized parklands, however, burning is just what the doctor ordered. Just as illness sends us to the doctor in search of medication to feel healthy so to does the land seek fire for rejuvenation. Prescribed burning is the most effective land management tool used to preserve and protect our ecologically diverse environment and to sustain a healthy ecosystem.

(April Welch is a park ranger at Long Hunter State Park in Hermitage.)